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A YOUNG RAINBOW TROUT (*SALMO IRIDEUS*) WITH A "HORN" (THE ACHENE OF *BIDENS CERNUA*) ON ITS HEAD

BY E. W. GUDGER

In August, 1928, I visited the trout hatchery just under Balsam Gap, six miles west of my home, Waynesville, North Carolina. The superintendent, Mr. Frank J. Rieger, finding that I was interested in fishes, showed me a bottle containing a considerable number of teratological trout embryos and then brought out as the prize of his collection the little trout which forms the subject of this article. Seeing my very great interest in this remarkable specimen, he kindly presented it to me. It is a young rainbow trout (*Salmo irideus*) about three months old and 33 mm. long, hatched and raised to its present size under the personal care of Mr. Rieger. Its death had been caused, so far as he could tell, by the fungus growth on the head at the base of the "horn." As to the cause of the development of the "horn," he could only suggest that it was possibly due to the improper handling of the water supply. He remarked that he had several other specimens of similar development, but not quite so perfect, together with other abnormalities, in the same lot of developing embryos with this little fish. When he changed the water supply his fish-cultural operations became much more successful.

My own ideas tallied exactly with his conclusions. This looked like a perfectly good horn, of chitinous or fibroid material, growing out of the middle of the forehead of the little fish, just at the level of the front edge of the eyes. There was, indeed, down the front edge of the snout a fine sliver of some material, but I thought it a part of the horn and paid no attention to it. I knew that hard cutaneous horns, abnormal growths, are found on the heads of various animals including that of the highest, *Homo sapiens*, and I presumed that this was some such object. The presence of fungus (probably *Achlya* or *Saprolegnia*) around the base of the horn was explained thus:—the little fish, swimming about, would strike the horn against the side of the tank, irritate and probably break the skin at its base, and thus offer an entrance for the spores of water

molds which, upon development, would form the mycelium that could be plainly seen.

This all seemed very plausible and very sound until some months later I had an artist make a drawing (Fig. 1) 3.2 times the natural size of the fish, by aid of a low-powered binocular dissecting microscope. The specimen had been viewed through this binocular before, but nothing had been found to controvert the structures described in the above paragraph. However, in order to clearly see the details of the horn, the fish was now put under the low power of a compound microscope. Then it was noticed that the horn, when seen in lateral view, had two roots, each a continuation of a ridge or fluting on the upper part of the horn, and that the anterior root had retrorse spines on it. These struc-

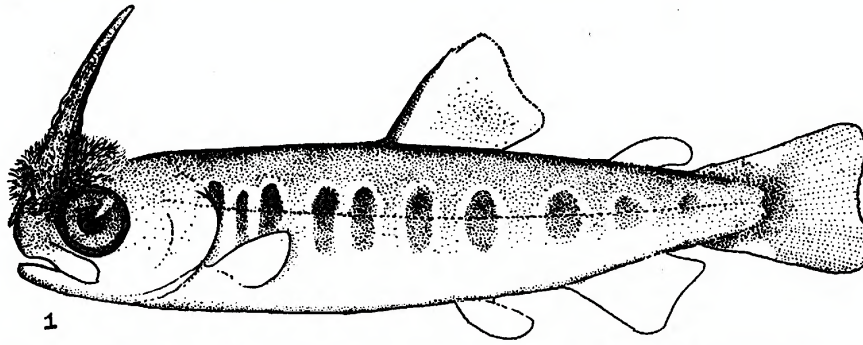

Fig. 1. The little fish with the "horn," enlarged about 3.2 times (33 to 107 mm.).

tures at once called for a different interpretation and it seemed that it might be some kind of seed which had become stuck fast to the fish's head. Just here the artist had to leave this work to take up some other illustrating, my own time was demanded for other work, so the little fish was put away, and it is only very recently that I have found the time to resume its study.

Later on, however, the specimen was seen by Prof. C. D. LaRue of the University of Michigan, while visiting the department of fishes. He suggested that it was a fruit of the "sticktight," *Bidens*. I have recently submitted the troutlet with its horn to Dr. J. K. Small, head curator of the New York Botanical Garden, for examination. He kindly identified the horn as the fruit of the "sticktight" or "bur marigold," *Bidens cernua*, sometimes called the "beggar tick." This plant, which is akin to the so-called "Spanish needle," is a member of the family Compositæ. The compound flower is somewhat flat, like that of a daisy, and when the

fruits or achenes are ripe they form a dense flat cluster, in which the pointed ends or bases are below and the broad tips with two to four awns project into the air. The awns, about half as long as the achene, are beset with many retrorse hooks, and the attachment of these to the hair of an animal or the clothing of man justify the common name "sticktight."

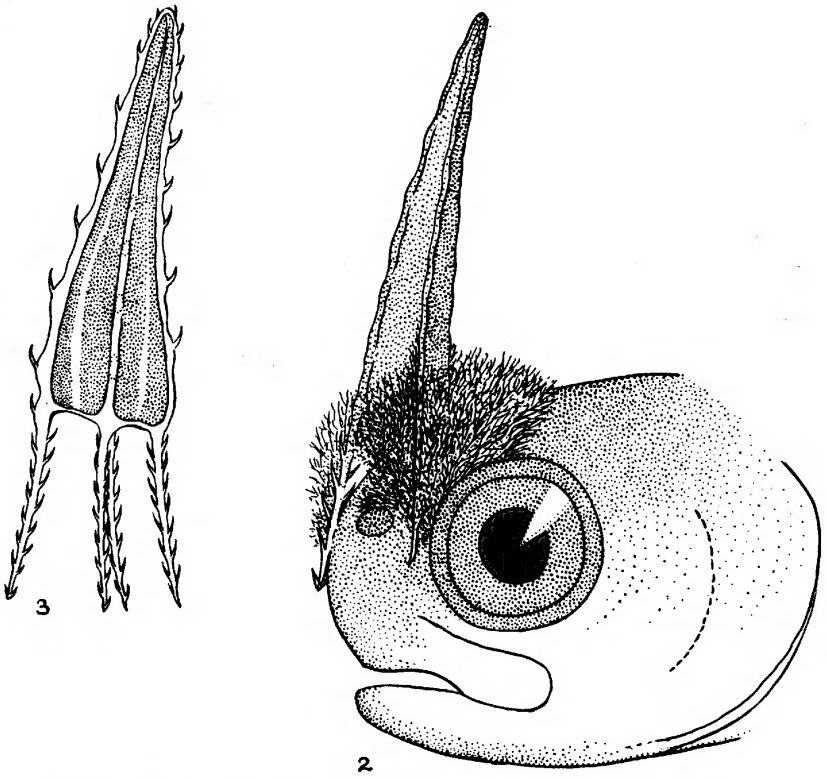

Fig. 2. The head and the "horn" enlarged about 7.5 times to show the details. Note the barbs on the anterior "root" of the horn.

Fig. 3. An achene of the "sticktight" enlarged about 7.5 times to show the details of its structure.

This is now not hard to understand. The tip of the horn is the base of the achene, the base of the horn is the blunt tip of the achene, and the sliver down the front of the head of the troutlet is one of the awns. Figure 2 shows the head of the little trout with the attached awn magnified 7.5 times. Two awns with their retrorse hooks are plainly visible.

Dr. Small gave me several achenes, and from these I picked out one having as nearly as possible the same size and shape as that attached to the young trout. Figure 3 is a drawing of this to the same scale and in the same position as that on the head of the little fish. Here is the four-sided achene with ribs at the angles, each beset with barbs. Each rib is continued as an awn, beset with two rows of retrorse hooks. The body of the achene attached to the little fish has no hooks, but has roughened places on the ribs. It would seem that the hooks have been broken or rubbed off this by the fish striking the horn against the sides of the hatching trough.

The attachment of the "horn" to this trout is easy to explain. The achene either was blown by a breeze through an open door or window into the hatchery and fell in the trough where the little fish was, or was carried in with the water supply, passing readily through an ordinary fine-meshed screen. The troutlet, swimming around in the tank, no doubt struck its head against the tip of the seed pod and the recurved hooks fastened themselves in the tender skin. Through the wounds thus made the spores of water molds penetrated into the tissues, sprouted and formed a mycelium which enmeshed the base of the horn and held it tightly in place. Less understandable is how the achene could have come to rest standing almost squarely in the median vertical plane of the body of the fish, with the rear awn, if present, set in the skin of the head squarely in the median line. What is more probable is that this achene had only three awns—two lateral ones and the one in front, the hinder one either having been broken off or having failed to develop. With only three awns present it is more understandable how this achene came to be saddled on the snout of the baby fish.

There is in the literature of fishes no account of any such structure on a fish, so far as I know, but there is an account of "sticktights" as fish destroyers. O. Lorenz in 1880 published a short article[1] on this subject. This is such an unusual matter that it seems well to reproduce the major part of it. He notes that the seed pods of this plant bore through the clothing of pedestrians and cause extreme irritation. After stating that it grows in damp soil, in pits, on shores and right in the water, he continues as follows:

Bidens cernua, var. *radiata* grows in the water. Its seeds are provided with three bristling beards, entirely covered with barbs from top to bottom. It is these barbs

[1] "Ein Fischverderber (*Bidens cernua*) aus dem Pflanzenreich." Oesterreich.-Ungarn. Fischerei-Zeitung, Wien, 1880, III, pp. 27–28.

which are injurious to pond fishes, namely those fishes which feed on a vegetable diet, thus including the whole family of the Cyprinidæ. . . .

. . . Through the breathing movements of the fishes the seed pods are disturbed so that they desert their radiate container and, vampire-like, sink their bearded points into the mouth and food openings of the fishes. The result of this is very unfortunate for professional pisciculturists. When I saw the fishes to whose mouth and nostril openings clung, leech-like, these fish pests which I had never before encountered, I captured as many of them as I could, and when I was sure of their identity (i.e., that of the fish pests), I pulled away the pod. In so doing a small piece of epidermis was always sacrificed to the barb. However, to ease my conscience, I observed that all the fishes on whom I had completed this operation swam about happily in the water, while all the others perished.

As soon as these fish destroyers push into the smelling, feeding, and breathing mechanisms of the fishes, an inflammation of the epidermis sets in and the wounded place is swollen with blood under the skin. After a few days, fungus-covered sores develop and, since the fish from now on is unable to get any nourishment, hunger is added to the pain caused by the wound and the two together rob the fish of its life. In the light of this knowledge, the extermination of *Bidens cernua* is to be recommended to every fish culturist or pond owner.

It will be of interest to add that Dr. Frank E. Lutz, of the American Museum, who keeps and breeds considerable numbers of aquarium fishes in his home at Ramsey, New Jersey, has made similar observations. In order that the water in his aquaria may be properly oxygenated, he brings in and plants in them water weeds from various ponds in the vicinity. These weeds are gathered from the edges of the ponds where "sticktights" grow, and hence before being put in the aquaria are well washed in order to rid them of achenes and other unwanted things. Nevertheless, some of the achenes of the sticktights often get into the aquaria, and the fishes are not infrequently found with these attached to their heads, as noted by Lorenz. It is necessary to remove the achenes by the aid of forceps, but if they are firmly anchored to the fish this procedure may cause considerable laceration, likely to be followed by fungus infection, and often by the death of the fish.

This added observation of Dr. Lutz' would indicate that these sticktights probably do more injury to fishes than is realized, and that their presence in our pond waters should be a matter of interest and concern to aquarists and fish farmers generally.